DOCUMENT RESUME

ED 325 616 CE 054 047

AUTHOR Toney, Michael R.
TITLE Learning Analysis in ISD: Implications for Designing Curriculum.
PUB DATE 4 Dec 89
NOTE 31p.; Paper presnted at the Annual Convention of the American Vocational Association (Orlando, FL, December 4, 1989).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Instructional Design; *Instructional Development; Instructional Systems; *Learning Strategies; *Task Analysis; *Training Methods; *Training Objectives
IDENTIFIERS Briggs (L); Gagne (Robert M); *Instructional Systems Development

ABSTRACT

This document describes an instructional analysis technique believed to be an expedient and effective alternative to the Gagne-Briggs model because, among other reasons, it is easier to teach to novice trainers. The technique is in use in the U.S. Marine Corps. The document consists of the following: an overview of the different kinds of analysis performed in instructional systems design from the analysis phase through the design phase where learning analysis occurs; a brief discussion of the Gagne-Briggs model; a discussion of the process and products of the more simple analysis recommended; and an appendix. The appendix contains a sample learning objective worksheet and two completed learning objective worksheets which demonstrate a learning analysis. (CML)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED325616

LEARNING ANALYSIS IN ISD: Implications for Designing Curriculum

Michael R. Toney
Captain, U.S. Marine Corps

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

M R Toney

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE 054047

Last year, I read an article in the Journal of Instructional Development that addressed instructional analysis as the missing link between task analysis and learning objectives. This article did a good job of distinguishing between task analysis and instructional analysis as well as providing some practical advice on how to use the Gagne/Briggs model of instructional analysis. However, I felt that the article was lacking in two areas: firstly, it failed to discuss, in depth, the job analysis which provides the basis for a good instructional analysis; secondly, the article should have discussed the drawbacks of this type of instructional analysis. Like the Gagne/Briggs model, most types of instructional analysis over-indulge in classification systems (i.e., Gagne's taxonomy of learning outcomes) which tend to cloud the task at hand for a trainer designing curriculum. This is particularly true when the trainer is lacking in experience or has little time to waste.

The learning analysis (instructional analysis) I am going to describe is an amalgamation of the best ideas and methods from a vast array of analysis techniques and is an expedient yet effective method when compared to the Gagne/Briggs model which is cumbersome and unwieldy in the hands of a practitioner. The most outstanding benefit of this learning analysis is how easy it is to teach the concept and methods to novice trainers and how quickly the learning analysis can be conducted by a trainer.

To do this, I will discuss three things: a quick overview of the different kinds of analysis performed in ISD from the analysis phase up to the point in the design phase where the learning analysis occurs, an even briefer discussion of the Gagne/Briggs model, and lastly a discussion on the process and products of the more simple learning analysis.

The learning analysis used in the Marine Corps is roughly based on the model of job task analysis developed by Mager and Beach in 1967.

Instructional Systems Development (ISD) in the Marine Corps is a system of practicality and economics, i.e., making the most of what we have. Our ISD model is a five-phase, 19 step, continuous loop, model and is used for all training and education conducted in the Marine Corps. I will only discuss the first two phases which are Analysis and Design. There are several types of analysis that occur in these two and each type of analysis has a different perspective. In the Analysis phase, two forms of analysis occur that lay down a strong foundation for further analyses. They are job analysis and task analysis:

Job Analysis-- breaks down a job into tasks and goals; the perspective is that we are describing the job as it is performed in the real world.

Task Analysis-the perspective is still in the world of job performance; breaks each task down into its performance steps and describes the real world behavior, condition, standards, for not just the task but also each performance step within that task.

The Design phases also contains two forms of analysis concerning target population and finally the learning analysis:

Target Population Analysis - analyzes the average student for training and describes mental and physical requirements as well as prerequisite skills and knowledge.

Learning Analysis - the analysis of each task and its performance steps into its learned components - what one must know or be able to do to perform each task - this is where we cross the bridge from the world of job

performance to the world of academia. The most important step in the ISD model and naturally the most difficult.

We spend a great deal of time with our trainers teaching them the criteria for a properly written task. This is important because it lays a firm foundation for the learning analysis and allows us to cut corners later. A task is best described as:

A unit of work with the following characteristics:

- performed over a short period of time
- has a specific beginning and end
- has an identifiable result or product
- can be observed and measured
- accomplished for its own sake
- is independent of other actions
- is a logical and necessary unit of work

Once we have described or defined the job through job analysis, we select tasks for training and then analyze each task. We then start the design phase by analyzing the target population. Once that is done, we are ready to conduct the learning analysis.

At this point I want to discuss very quickly the Gagne/Briggs method which they term "instructional analysis." This method is described in their book Principals of Instructional Design (1979) and in the IPISD. The method is based on Gagne's taxonomy of learning outcomes and provides a structured and verifiable method for analyzing tasks into learned components. The most important aspects of the model is that it creates a hierarchy of learning and identifies prerequisite knowledge and skills for each terminal objective. It also facilitates instructional sequencing because the hierarchy captures the

conceptual flow of the knowledge and skills. The drawbacks to this system are:

- the documentation of the analysis is cumbersome and unwieldy
- the process is often difficult for trainers to understand (due mostly to the taxonomy of learning outcomes)
- the process is time consuming
- the process fails to make the transition from the real world of job performance to the schoolhouse
- it fails to explore that part of the process wherein a differentiation is made between prerequisite knowledge and skills possessed by the target population and knowledge and skills selected for training
- it fails to explain a method for editing knowledge and skills into learning objectives

We teach our trainers learning analysis as a linear process although it is, like all processes in systematic instructional design, an iterative, heuristic process. Throughout the process, the designer must shift perspective constantly in order to consider the real world of job performance, the schoolhouse and its resource constraints, and the target population. Figure One is a blank copy of a Learning Objective Worksheet Part I which is used to document the learning analysis. The information for items one through six are copied verbatim from the Job Data Sheet which is the document used to perform the task analysis. Once this is accomplished, the following steps are performed:

STEP 1 - The Terminal Learning Objective (TLO) is written in the block provided. Note that this is where you cross the bridge for the first time from the real world to the schoolhouse. We always try to each to the real world task (by requiring the student to perform the task behavior) but that is not always possible because of resource constraints within the schoolhouse. Therefore some degrading of the task behavior, conditions and standards may be necessary. Care should be taken in degrading a task since we want to train students as close to possible what occurs in the real world. If the resources

of your school permit it, your TLO would be no different than the training objective written directly above it on the LOW I. We do teach our trainers how to use Bloom's Taxonomy but only to use it when the task must be degraded. Bloom's Taxonomy helps the novice designer in keeping the task behavior in the correct learning domain at the highest possible level of learning. The taxonomy is thus used as thinking tool which assists our designers in selecting the words that best describe the intent of the objective.

STEP 2 - Column A. Identify the knowledge (what the job holder must know) and skills (what the job holder must do) that are necessary for the job holder to perform the steps and thus the task and place them in column A. Knowledge and skills are identified by asking the question at the bottom of the LOW I over and over again for each step until you have exhausted all the possibilities. Upon completion, circle the knowledge and skills listed that are not already possessed by the target population. An important point to understand is that a knowledge or skill is based in the real world of performance not the world of academia. You will want to ask the question of not just the steps but also the training objective and the TLO. This will capture any real world knowledge and skills that might be missed. An example is that by asking the question of the training objective you may discover that an important knowledge is to know the sequence of the performance steps -- this knowledge would not be captured otherwise.

STEP 3 - Column B. The knowledge and skills for column B are identified by asking the same question you asked in column A only this time you ask it of only the knowledge and skills you circled in column A. Once again, upon completion of column B, you circle the knowledge and skills listed that are not already possessed by the target population.

STEP 4 - Additional Columns. Additional columns C, D, E, etc., may be needed to adequately analyze the learning process for the task. You know you are finished when you have a column where you have not circled any of the knowledge and skills or you have an empty column.

STEP 5 - Combining. Prior to editing knowledge and skills into learning objectives we must look at the completed analysis and ask ourselves: What behavior could the student perform that would convince us he possesses that knowledge or skill? It may be possible that one behavior could encompass several knowledge and skills. This process is called combining. A combination is indicated by circling a group of already circled (individually) knowledge and skills. Remember that, if you are combining, the one behavior you select must convince you that the student possesses all the knowledge and skills in that combination.

STEP 6 - Once you have made any necessary combinations, you must sequence the knowledge and skills. This is done by placing a unique, small letter designator by each circled knowledge and skill or combination. The sequencing should follow the procedure (if there is one) in the learning hierarchy that you have created or it should follow the common sense flow of simple to complex with "a" being first.

STEP 7 - (See Figure 2) Enabling Learning Objectives (ELO). Write an ELO for each circled knowledge or skill or combination and record it on the Learning Objective Worksheet Part II (LOW II). Keep in mind that you are

again crossing the bridge from the real world job performance (the knowledge and skills that you circled) to the academic world (ELO's). So once again you must consider the school's resources and write your enabling learning objectives accordingly.

Some of the products of the learning analysis are obvious. Terminal and Enabling Learning objectives have been written and the transition from the real world to the academic world completed. The products that are not so obvious are that you must now go back to the target population description and ensure that all prerequisite knowledge and skills are added (if necessary). So the Learning analysis ties up any loose ends you may have had with the target population description. The prerequisite knowledge and skills also provide the basis for developing pretests for a specific course of instruction. Also you have already created and sequenced the main and sub-main teaching points for your lesson plan or detailed outline.

We encourage our trainers to under-develop the learning analysis as well as subsequent instructional materials when there is less available time since we expect changes after first time validation. We are still looking for an even simpler, quicker method of learning analysis and we are to the point where we have concluded that in order to do that we will have to degrade the level of the analysis.

Today, I gave you a quick look at the first two phases of the Marine Corps' ISD model in terms of analysis only. I also briefly discussed the Gagne/Briggs Instructional Analysis. Lastly, I showed you the process the Marine Corps uses to bridge the gap between the real world and training.

NOTE: SEE APPENDIX A FOR A SAMPLE OF A LEARNING ANALYSIS WITH THE ANALYSIS ON THE LOW PART I AND THE PRODUCTS OF THE ANALYSIS ON THE LOW PART II.

LEARNING OBJECTIVE WORKSHEET (LOW)

MCDEC 1550/41 (4/87) FPP 81748

JOB TASK DESIGNATOR	TASK BEHAVIOR TASK CONDITION TASK STANDARD
STEPS/DECISIONS	TLO
	REQUIRED KNOWLEDGE/SKILLS
	A | B

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

FIGURE 1

LEARNING OBJECTIVES AND TESTS	METHOD(S)	MEDIA
TLO (From Part I) **TEST:** **ELO:** **Behavior:** **Condition:** **Standard:** **TEST:** **ELO:** **Behavior:** **Condition:** **Standard:** **TEST:**		

FIGURE 2

MCDEC 1550/41 (4/87) FPP 81749

LOW I

JOB BASIC INSTRUCTOR

TASK DESIGNATOR 3.1.1

STEPS/DECISIONS

TASK BEHAVIOR EVALUATE A LEARNING OBJECTIVE

TASK CONDITION GIVEN A LEARNING OBJECTIVE AND WITH THE AID OF REFERENCES

TASK STANDARD NOTE! SEE JDS

TLO WITH REFERENCES, EVALUATE (IN WRITING) A LEARNING OBJECTIVE PER THE IMS CHECKLIST.

REQUIRED KNOWLEDGE/SKILLS

	A	B
	KNOW THE DIFFERENCE BETWEEN A TLO AND AN ELO	KNOW WHAT AN LOW I IS
	KNOW WHERE TO LOCATE LO'S	KNOW HOW TO IDENTIFY AN LOW II IS
	KNOW THE PURPOSE OF LO'S	KNOW THE DIFFERENCE BETWEEN JOB PERFORMANCE AND ACADEMIC PERFORMANCE
	KNOW WHY A LO MAY BE DEGRADED	
3.1.1.1 DETERMINE IF LO HAS AN APPROPRIATE BEHAVIOR	KNOW THE CRITERIA FOR AN APPROPRIATE BEHAVIOR	KNOW WHAT OBSERVABLE MEANS
	KNOW HOW TO IDENTIFY A BEHAVIOR	KNOW WHAT MEASURABLE MEANS
	KNOW HOW A BEHAVIOR RELATES TO EVALUATION	KNOW WHAT AN APPROPRIATE ACTION VERB IS
		KNOW HOW TO "QUALIFY" AN ACTION VERB
		KNOW WHAT AN APPROPRIATE OBJECT IS
		KNOW WHAT A RELIABLE BEHAVIOR IS
		KNOW WHAT A REALISTIC BEHAVIOR IS

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

MCDEC 1550/41 (4/87) FPP 81748

JOB	TASK BEHAVIOR
TASK DESIGNATOR	TASK CONDITION
	TASK STANDARD
STEPS/DECISIONS	TLO

REQUIRED KNOWLEDGE/SKILLS

1c	1d.
know what a training objective is f.	
know what a "construct" is g.	
know what an action verb qualifier is	
know what Reliable means	
know what Realistic means	

3.1.1.1 cont'd

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

MCDEC 1550/41 (4/87) PPP 81748

JOB Basic Instructor

TASK DESIGNATOR 3.1.1

STEPS/DECISIONS

TASK BEHAVIOR

TASK CONDITION

TASK STANDARD

TLO

REQUIRED KNOWLEDGE/SKILLS

	A	B
3.1.1.2 Determine whether LO has an appropriate condition	Know how to identify a condition	Know what constitutes aiding and limiting aspects of a condition
	Know the criteria for an appropriate condition	Know how resources apply to a condition
	Know what the purpose of a condition is (h.)	Know how information applys to a condition
	Know how a condition relates to evaluation	
	Know how to describe the important parts of the environment	Know what constitutes the physical environment (i)
		Know what constitutes the social environment

BEFORE THE STUDENT CAN ____ HE/SHE MUST FIRST KNOW ____

2a

JOB	TASK BEHAVIOR
TASK DESIGNATOR	TASK CONDITION
	TASK STANDARD
STEPS/DECISIONS	TLO

REQUIRED KNOWLEDGE/SKILLS

	kc	kd.
3.1.1.2 cont'd	know what aiding means know what Limiting means know what condition resources are know what condition information is	j.

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

MCDEC 1550/41 (4/87) PPP 91749

JOB Basic Instructor

TASK DESIGNATOR 3.1.1

TASK BEHAVIOR

TASK CONDITION

TASK STANDARD

STEPS/DECISIONS

TLO

REQUIRED KNOWLEDGE/SKILLS

	A	B
3.1.1.3 Determine whether LO has an appropriate standard	Know how to identify a standard Know the criteria for an appropriate standard Know what the purpose of a standard is Know how a standard relates to evaluation	Know the difference between a quantitative standard and a qualitative standard

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

3a

JOB	TASK BEHAVIOR
TASK DESIGNATOR	TASK CONDITION
	TASK STANDARD
STEPS/DECISIONS	TLO

REQUIRED KNOWLEDGE/SKILLS

✗c	✗d.
know how time applys to a standard know how RATE OF WORK applys to a standard know how accuracy applys to a standard know how quality applys to a standard	2.

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

MCDEC 1350/41 (4/87) FPP 81748

JOB Basic Instructor

TASK DESIGNATOR 3.1.1

STEPS/DECISIONS

TASK BEHAVIOR

TASK CONDITION

TASK STANDARD

TLO

REQUIRED KNOWLEDGE/SKILLS

	A	B
3.1.1.4 Determine whether LO has an appropriate designator	d. know what the purpose of a designator is	
	know where designators are located	e. know the designation system for TLO's and ELO's

BEFORE THE STUDENT CAN _____ HE/SHE MUST FIRST KNOW _____

LOW PART II

		METHODS	MEDIA
TLO:	With references, evaluate in writing, a learning objective per the IMS checklist. (3.1.1)	L, PA	TP,CAI
TEST:	Listed below are five learning objectives. Evaluate each one by filling in the answers to each set of questions following the listed learning objective. NOTE: see attached test and checklist		
ELO:	Without references and in writing, state the purpose of a learning objective IAW Student Handout I1110. (3.1.1a)	L, PF	CAI
TEST:	In the space provided below, state the purpose of a learning objective. NOTE: see attached test and test key. (in class evaluation)		
ELO:	Without references, in your own words, describe in writing the difference between an ELO and a TLO IAW Student Handout I1110. (3.1.1b)	L, PF	CAI
TEST:	In your own words, describe the difference between an ELO and a TLO in the space provided below. NOTE: see attached test and test key.		
ELO:	Without references and given two descriptions of documents which contain learning objectives, identify each document by writing the name of the document by the description IAW Student Handout I1110. (3.1.1c)	L, PF	CAI
TEST:	Below are two descriptions of documents which contain learning objectives. Identify each document by writing the name of the document by its description. NOTE: see attached test and test key. (in class evaluation)		

		METHOD	MEDIA
ELO:	Given a list of learning objectives and with references, by using the designator identify in writing whether the learning objective is a TLO or an ELO IAW Student Handout I1110. (3.1.1d)	L	CIA, TP
TEST:	Evaluated by TLO test, see attached checklist.		
ELO:	With references, given five learning objectives and their respective LOW Part I's, locate the task behavior or knowledge/skill each learning objective relates to IAW Student Handout I1110. (3.1.1e)	L	CAI,TP, LCB
TEST:	Evaluated by TLO test, see attached checklist.		
ELO:	With references, given completed LOW Part I's a scenario describing an instructional setting and five learning objectives, determine, with justification, if the learning objective has been degraded or not by selecting yes or no IAW Student Handout I1110. (3.1.1f)	L, PA	CAI,TP LCB
TEST:	Evaluated by TLO test, see attached checklist.		
ELO:	With references and given five learning objectives, identify the behavior in the learning objective by writing the behavior verbatim from each learning objective IAW Student Handout I1110. (3.1.1g)	L, PA	CAI, TP LCB
TEST:	Evaluated by TLO test, see attached checklist. see detailed outline for practical application.		
ELO:	Without references and in writing, state the purpose of a condition in a learning objective IAW Student Handout I1110. (3.1.1h)	L, PF	CAI
TEST:	In the space provided below, state the purpose of a condition in a learning objective. NOTE: See attached test and test key. (in class evaluation)		

		METHOD	MEDIA
ELO:	Without references, write two examples of the environment with one example describing the physical environment and one example describing the social environment IAW Student Handout I1110. (3.1.1i)	L, PF	CAI
TEST:	In the space provided below, write two examples of the environment with one example describing the physical environment and one example describing the social environment. NOTE: see attached test and test key. (in class evaluation)		
ELO:	With references and given five learning objectives, identify the condition in the learning objective by writing the condition verbatim from each learning objective IAW Student Handout I1110. (3.1.1j)	L, PA	CAI, TP LCB
TEST:	Evaluated by TLO test, see attached checklist; see detailed outline for practical application.		
ELO:	Without references and in writing, state the purpose of a standard in a learning objective IAW Student Handout I1110. (3.1.1k)	L, PF	CAI
TEST:	In the space provided below, state the purpose of a standard in a learning objective. NOTE: see attached test and test key. (in class evaluation)		
ELO:	With references and given five learning objectives, identify the standard in the learning objective by writing the standard verbatim from each learning objective IAW Student Handout I1110. (3.1.1L)	L, PA	CAI, TP LCB
TEST:	Evaluated by TLO test, see attached checklist; see detailed outline for practical application.		

CHECKLIST

LEARNING OBJECTIVE WORKSHEET PART I

IMS Rev/MAR 89

Name: Evaluator:

	Y/N	PP	PNTS	REMARKS
1. Job is verbatim from JDS.		1		
2. Task Designator is verbatim from JDS.		1		
3. Task Behavior is verbatim from JDS.		1		
4. Task Condition is verbatim from JDS.		1		
5. Task Standard is verbatim from JDS.		1		
6. Steps/Decisions are verbatim from JDS.		1		
7. Step Designators are verbatim from JDS.		1		
TLO ON LOW I				
1. Is the behavior observable, measurable, and repeatable in the academic environment/if not there must be a qualifier verb that ensures an observable product.		5		
2. Is the TLO at the highest level of the appropriate domain and consistent with resource constraints.		5		
3. Does the Behavior contain a single appropriate verb and object.		10		
4. Does the Condition match the TO except for adjustments to meet any academic constraints.		10		
5. Does the Standard reflect academic constraints and tell the student exactly how well the student will have to perform.		10		
6. Is the wording of the TLO proper in all aspects.		3		
		50		

(1.2.3)
(2.2.3)

CHECKLIST

LEARNING OBJECTIVE WORKSHEET PART II

IMS Rev/MAR 89

Name: Evaluator:

	Y/N	PP	PNTS	REMARKS
TLO				
1. Is the TLO verbatim from LOW I?		1		
2. Does the TLO have a TLO Designator that is verbatim from LOW I? Is the designator in parenthesis after LO?		1		
3. Is the evaluation method (test) consistent and adequate with the TLO?		13		
4. Is there an answer key for each ELO eval item?		10		
# ELO:				
1. Is the Behavior observable, replicable, and measurable in an academic environment?		10		
2. Does the Behavior relate to the circled K/S's (would it convince the instructor that the student possesses the K/S or all the K/S's of a group)?		10		
3. Does the Condition include aids, limitations, environment, and any general information?		10		
4. Is the Standard replicable/appropriate?		10		
5. Is the Designator correct? (three digit with small letter that is the same as the K/S it applies to)? Is the designator in parenthesis after the LO?		3		
6. Is the eval item consistent and adequate with ELO? Adequate means that if the student performs, to Standard, the Behavior, then he would convince the instructor that he possesses all the K/S at the combination the ELO applies to.		12		

80

(1.2.5)
(1.2.6)
(1.2.7)
(1.2.8)